

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A system for storing checkpoint data ~~state information~~, comprising:

a network interface to an external network; and

a persistent memory unit coupled to the network interface, wherein:

the persistent memory unit is configured to receive the checkpoint data into a region of the persistent memory unit via a remote direct memory write command from a primary process through the network interface, and to provide access to the checkpoint data in the region via a remote direct memory read command from ~~[[the]]~~ a backup process through the network interface, wherein the remote direct memory write command is preceded by a create request for the region and the read command is preceded by an open request for the region; and

the backup process provides recovery capability in the event of a failure of the primary process.

2. (Currently Amended) The system of Claim 1, further comprising:

a persistent memory manager configured to provide address context information to the network interface ~~and to keep the meta-data on the persistent memory unit consistent with the checkpoint data stored on the persistent memory unit.~~

3. (Previously Presented) The system of Claim 1, wherein the persistent memory unit is configured to provide remote direct memory read access to the checkpoint data to another processor, and the backup process is executed by the other processor.

4. (Previously Presented) The system of Claim 1, wherein the persistent memory unit provides the checkpoint data through remote direct memory reads by the backup process after the primary process fails.

5. (Previously Presented) The system of Claim 1, wherein the persistent memory unit is configured to store multiple sets of checkpoint data through remote direct memory writes sent from the processor at successive time intervals.

6. (Previously Presented) The system of Claim 5, wherein the persistent memory unit provides the multiple sets of checkpoint data through remote direct memory reads upon request by the backup process at one time.

7. (Previously Presented) The system of Claim 1, wherein the primary process provides the checkpoint data to the persistent memory unit independently from the backup process.

8. (Original) The system of Claim 1, wherein the persistent memory unit is configured as part of a remote direct memory access-enabled system area network.

9. (Original) The system of Claim 1, wherein the persistent memory unit is configured with address protection and translation tables to authenticate requests from remote processors, and to provide access information to authenticated remote processors.

10. (Previously Presented) A method for recovering the operational state of a primary process, comprising:

mapping virtual addresses of a persistent memory unit to physical addresses of the persistent memory ;

remote direct memory writing checkpoint data regarding the operational state of the primary process to the persistent memory unit;

remote direct memory reading the checkpoint data from the persistent memory unit subsequent to storing access information for the checkpoint data to the physical addresses of the checkpoint data in the persistent memory unit when the primary process opens a memory region for the checkpoint data; and

providing the access information to subsequent requestors of the checkpoint data.

11. (Original) The method of Claim 10, further comprising: providing context information regarding the addresses to the primary process and the backup process.

12. (Previously Presented) The method of Claim 10, further comprising:
remote direct memory reading the checkpoint data by the backup process upon failure of the primary process.

13. (Original) The method of Claim 10, further comprising:
overwriting the checkpoint data with current checkpoint data.

14. (Previously Presented) The method of Claim 10, further comprising:
appending updated checkpoint data to at least one previous set of the checkpoint data.

15. (Previously Presented) The method of Claim 14, further comprising:
clearing the multiple sets of checkpoint data.

16. (Previously Presented) The method of Claim 14, further comprising:
allowing the backup process to remote direct memory read previously unread portions of the checkpoint data upon failure of the primary process; and
resuming functions performed by the primary process with the backup process.

17. (Cancelled)

18. (Previously Presented) The method of Claim 10, further comprising:
establishing a connection to a process requesting access to the checkpoint data; and
binding the access information to the connection.

19. (Previously Presented) The method of Claim 10, further comprising:
verifying authentication information from the subsequent requestors.

20. (Original) The method of claim 10, further comprising:
authenticating a persistent memory manager during initialization of address protection
and translation tables on the persistent memory unit.

21. (Previously Presented) A computer product, comprising:
computer executable instructions embodied in a computer readable medium and operable to:
allow remote direct memory access to a persistent memory unit from a remote processor
via a network, wherein the remote direct memory access references a persistent memory virtual
address;
store checkpoint data from a primary process;
authenticate requests from remote processors, and provide access information to
authenticated remote processors based on address protection and translation tables in the
persistent memory unit;
translate the virtual address to a physical address in the persistent memory ; and
allow access to the checkpoint data for use in a backup process.

22. (Previously Presented) The computer product of Claim 21, further comprising:
computer executable instructions embodied in a computer readable medium and operable to:
allow the processor to access address context information.

23. (Previously Presented) The computer product of Claim 21, further comprising:
computer executable instructions embodied in a computer readable medium and operable to:
store multiple updates to the checkpoint data sent at successive time intervals.

24. (Previously Presented) The computer product of Claim 21, further comprising:
computer executable instructions operable to:
allow the backup process to access the multiple sets of the checkpoint data at one time.

25. (Original) The computer product of Claim 21, wherein the persistent memory is
configured as part of a remote direct memory access-enabled system area network.

26-31. (Cancelled)

32. (Cancelled)

33. (Currently Amended) The method of Claim [[32]] 34, further comprising:
overwriting the checkpoint data in the persistent memory unit with current checkpoint
data via [[a]] another remote direct memory access write command.

34. (Currently Amended) ~~The method of Claim 32, further~~ A method for recording the
operational state of a primary process, comprising:
appending updated checkpoint data associated with the primary process to a previous
set of the checkpoint data stored in a persistent memory unit via a remote direct memory access
write command; and
receiving access information for physical addresses of checkpoint data in the persistent
memory from the persistent memory unit.

35. (Cancelled)

36. (Currently Amended) The method of Claim [[35]] 37, further comprising:
periodically transmitting the remote direct memory access read command to retrieve at least a portion of the checkpoint data for the backup process.

37. (Currently Amended) ~~The method of Claim 35, further~~ A method for retrieving the operational state of a primary process, comprising:

transmitting [[the]] a remote direct memory access read command, to a remote persistent memory unit from a backup process for the primary process, to retrieve previously unread portions of [[the]] checkpoint data associated with the primary process upon failure of the primary process; and
receiving access information for physical addresses of the checkpoint data in the persistent memory from the persistent memory unit.

38. (New) The system of Claim 1, wherein the persistent memory unit is further configured to store meta-data regarding the contents and layout of memory regions within the persistent memory unit and to keep the meta-data consistent with the checkpoint data stored on the persistent memory unit.

39. (New) The system of Claim 1, wherein the persistent memory unit is further configured to provide access to the checkpoint data in another region via a remote direct memory read command from the backup process through the network interface, wherein the read command is preceded by an open request for the another region.